



DEPARTMENT OF WATER RESOURCES

Northern Region

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DRAFT

GROUNDWATER LEVEL MONITORING REPORT SACRAMENTO VALLEY and REDDING GROUNDWATER BASINS CHANGE IN GROUNDWATER ELEVATIONS:

FALL 2008 TO FALL 2009

The Groundwater Level Monitoring Report summarizes the change between Fall 2008 and Fall 2009 groundwater level measurements collected from wells in the northern Sacramento Valley by the Department of Water Resources (DWR) Northern District and DWR monitoring cooperators. According to the Sacramento Valley Water Year Index, 2008 is classified as a "Critical" water year and 2009 is classified as a "Dry" water year.

Northern Sacramento Valley groundwater levels are measured up to four times a year as part of our ongoing data collection program. During 2009 groundwater levels are measured on a monthly basis from spring until fall due to the severe drought condition. Many of the wells have over 30 years of monitoring history, with the longest active monitoring well dating back to 1921, or 88 years. Groundwater level data provides valuable information regarding seasonal fluctuations and long-term changes in groundwater level trends over time. The groundwater level data presented in this report includes the Sacramento Valley and Redding groundwater basin portions of: Butte, Colusa, Glenn, Tehama, and Shasta counties.

The groundwater level monitoring grid includes active and inactive wells that were drilled by different methods, with different designs, for different uses. Types of well use include: domestic, irrigation, observation, and other (stock, unused, etc) wells. Wells may be constructed over discrete aquifer intervals or multiple aquifer zones. The total depth of monitoring grid wells ranges from 18 feet below ground surface (ft-bgs), to 1,380 ft-bgs; with screened intervals ranging from 8 to 1,310 ft-bgs. The wide variety of well uses and construction provides the opportunity to examine the groundwater level responses to seasonal and long-term changes in climate and land use over multiple aquifer zones.

Static groundwater level data from 478 monitoring wells were analyzed by well use and well depth for the October 2008 versus October 2009 monitoring periods. Wells that were pumping or had been recently pumped at the time of measurement were excluded from the analysis due to inherent uncertainties associated with pumping level data. It is important to note that the change in groundwater elevation data represents the individual annual change which occurred in one well over two monitoring periods. Daily and seasonal changes in groundwater levels are also occurring and are influenced by many factors, such as a nearby well pumping, changing land use, weather, precipitation, and surface water supply, among others.

Seasonal and long-term changes in groundwater levels in individual wells are best examined with hydrographs. Hydrographs for each of the monitoring wells can be obtained at DWR's Water Data Library: <http://www.water.ca.gov/waterdatalibrary/>. Regional evaluation of seasonal or long-term changes in groundwater levels are typically evaluated through

groundwater contour mapping. Annual groundwater elevation contours, along with copies of this report, are available online at DWR Northern District's website:
http://www.water.ca.gov/groundwater/data_and_monitoring/northern_region/GroundwaterLevel/gw_level_monitoring.cfm

Groundwater elevation is determined by subtracting the measured depth to groundwater in a well from the ground surface elevation, and is expressed as feet-mean sea level (ft-msl). The change in groundwater elevation was calculated by subtracting the Fall 2008 measurements from the Fall 2009 for each of the monitoring wells. For Example: a change in groundwater level indicated by a positive number indicates that the groundwater level was higher in Fall 2009 than it was in Fall 2008. A change in groundwater level indicated by a negative number indicates that the groundwater level was lower in Fall 2009 than it was in Fall 2008.

The groundwater level data that were analyzed for this report are summarized below and are listed in Tables 1 and 2, and illustrated in Plates 1 through 4. Tables 1 and 2 show the change in groundwater elevation by well depth and well use, respectively, for Fall 2008 to Fall 2009.

Also included are four plates. Plates 1 through 3 show locations of the wells by well depth, well type, and change in groundwater level elevation from Fall 2008 to Fall 2009. Plate 4 shows the locations of observation wells only, by well depth and by the change in groundwater level.

GENERAL SUMMARY:

Groundwater Level Change Fall 2008 to Fall 2009

- ✓ On average, groundwater levels in the northern Sacramento Valley and the Redding Basins were down by about 0.7 feet (-0.7 ft) from Fall 2008 compared to Fall 2009.
- ✓ The greatest decrease in groundwater elevation from 2008 to 2009 occurred in an observation well on the west side of the Sacramento Valley in Glenn County that had a decline of 25.7 feet.
- ✓ The greatest increase in groundwater elevation from 2008 to 2009 was in an observation well in Glenn County with an increase of about 14.3 feet.
- ✓ Groundwater levels were down, on average, in all well types except irrigation which showed no change between Fall 2008 and Fall 2009 on average:

Fall 2008- Fall 2009

▪ domestic wells:	0.9 foot (-0.9 ft)
▪ irrigation wells:	0 feet (0 ft)
▪ observation wells:	0.9 feet (-0.9 ft)
▪ other well types:	1.4 feet (-1.4 ft)

- ✓ Groundwater levels were down, on average, for all well depths:

Fall 2008- Fall 2009

▪ 0 to 200 feet deep:	0.5 foot (-0.5 ft)
▪ 201 feet and 600 feet deep:	0.2 feet (-0.2 ft)
▪ 601 and 1380 feet deep:	2.2 feet (-2.2 ft)
▪ unknown well depth:	1.1 feet (-1.1 ft)

- ✓ Looking at the average groundwater level decline by county:

Fall 2008- Fall 2009

▪ Butte County:	up 0.2 feet (0.2 ft)
▪ Colusa County:	2.2 feet (-2.2 ft)
▪ Glenn County:	1.9 feet (-1.9 ft)
▪ Tehama County:	up 0.2 feet (0.2 ft)
▪ Shasta County:	0.3 feet (-0.3 ft)

FOLLOWING ARE THE TABLES AND PLATES SUMMARIZING THE GROUNDWATER LEVEL DATA COLLECTED:

TABLES

Table 1. Fall 2008- Fall 2009 Change in Groundwater Elevation by Well Depth

Table 2. Fall 2008- Fall 2009 Change in Groundwater Elevation by Well Use

PLATES

Plate 1. Sacramento Valley Change in Groundwater Elevation Map
Fall 2008 to Fall 2009
Monitoring Wells Up to 200 Feet in Depth

Plate 2. Sacramento Valley Change in Groundwater Elevation Map
Fall 2008 to Fall 2009
Monitoring Wells 200 Feet to 600 Feet in Depth

Plate 3. Sacramento Valley Change in Groundwater Elevation Map
Fall 2008 to Fall 2009
Monitoring Wells Over 600 Feet in Depth

Plate 4. Sacramento Valley Change in Groundwater Elevation Map
Fall 2008 to Fall 2009
Dedicated Groundwater Observation Wells

Table 1. Fall 2008- Fall 2009 Change in Groundwater Level Elevation by Well Depth.

DEPARTMENT OF WATER RESOURCES					
FALL GROUNDWATER ELEVATION MEASUREMENTS					
NORTHERN SACRAMENTO VALLEY & REDDING BASINS, CALIFORNIA					
CHANGE IN GROUNDWATER ELEVATION					
FALL 2008 to FALL 2009					
	All Well Depths	Well Depth			
		0 to 200	201 to 600	601 to 1,500	Unknown
BUTTE					
Maximum Increase in GWE*	12.6	4.5	12.6	7	0
Maximum Decrease in GWE	-7.3	-5.9	-7.3	-4.4	-1.5
Average GWL Change (ft)	0.2	-0.1	0.7	-0.1	-0.9
Range of GWL Change (ft)	19.9	10.4	19.9	11.4	1.5
Number of Wells	102	41	39	17	5
COLUSA					
Maximum Increase in GWE*	10.9	2.4	8.4	10.9	0
Maximum Decrease in GWE	-17.1	-6.9	-17.1	-10.8	-1.8
Average GWL Change (ft)	-2.2	-0.4	-3.2	-3.3	-1.8
Range of GWL Change (ft)	28.0	9.3	25.5	21.7	1.8
Number of Wells	48	16	25	6	1
GLENN					
Maximum Increase in GWE*	14.3	6.9	14.3	0.1	0
Maximum Decrease in GWE	-25.7	-15.8	-25.7	-20.3	-4.4
Average GWL Change (ft)	-1.9	-1.6	-0.9	-4.8	-1.3
Range of GWL Change (ft)	40.0	22.7	40.0	20.4	4.4
Number of Wells	141	59	54	24	4
TEHAMA					
Maximum Increase in GWE*	9.3	9.3	9.2	2.1	4.2
Maximum Decrease in GWE	-8.6	-7.1	-7.1	-4.6	-8.6
Average GWL Change (ft)	0.2	0.2	0.8	-1	-1
Range of GWL Change (ft)	17.9	16.4	16.3	6.7	12.8
Number of Wells	158	64	64	24	6
REDDING BASIN					
Maximum Increase in GWE*	9.1	1.7	9.1	0	--
Maximum Decrease in GWE	-3.7	-3.1	-3.7	-0.8	--
Average GWL Change (ft)	-0.3	-0.9	0.5	-0.8	--
Range of GWL Change (ft)	12.8	4.8	12.8	0.8	
Number of Wells	29	15	13	1	0
TOTAL					
Maximum Increase in GWE*	14.3	9.3	14.3	10.9	4.2
Maximum Decrease in GWE	-25.7	-15.8	-25.7	-20.3	-8.6
Average GWL Change (ft)	-0.7	-0.5	-0.2	-2.2	-1.1
Range of GWL Change (ft)	40.0	25.1	40.0	31.2	12.8
Number of Wells	478	195	195	72	16
Note: A positive number indicates that groundwater levels were higher in 2009 than in 2008; a negative					
*GWE=Groundwater Elevation					

Table 2. Fall 2008 - Fall 2009 Change in Groundwater Level Elevation by Well Use.

DEPARTMENT OF WATER RESOURCES FALL GROUNDWATER ELEVATION MEASUREMENTS NORTHERN SACRAMENTO VALLEY & REDDING BASINS, CALIFORNIA					
CHANGE IN GROUNDWATER ELEVATION BY WELL USE FALL 2008 to FALL 2009					
	All Well Depths	Well Use			
		Domestic	Irrigation	Observation	Other
BUTTE					
Maximum Increase in GWE* (ft)	12.6	4.5	11.4	12.6	0.8
Maximum Decrease in GWE (ft)	-7.3	-5.9	-7.3	-5.4	-1.4
Average GWL Change (ft)	0.2	-0.5	1	0.1	-0.6
Range of GWL Change (ft)	19.9	10.4	18.7	18.0	2.2
Number of Wells	102	19	31	42	10
COLUSA					
Maximum Increase in GWE* (ft)	10.9	1.6	2.4	8.4	10.9
Maximum Decrease in GWE (ft)	-17.1	-17.1	-10.8	-13.7	-8.3
Average GWL Change (ft)	-2.2	-2.2	-2.4	-2.5	-2.1
Range of GWL Change (ft)	28.0	18.7	13.2	22.1	19.2
Number of Wells	48	15	13	8	12
GLENN					
Maximum Increase in GWE* (ft)	14.3	2.9	4.7	14.3	4.4
Maximum Decrease in GWE (ft)	-25.7	-12.1	-8.7	-25.7	-15.8
Average GWL Change (ft)	-1.9	-1.5	-1.4	-2.1	-2.5
Range of GWL Change (ft)	40.0	15.0	13.4	40.0	20.2
Number of Wells	141	23	35	76	7
TEHAMA					
Maximum Increase in GWE* (ft)	9.3	3.3	8.2	9.3	3.2
Maximum Decrease in GWE (ft)	-8.6	-8.6	-7.1	-4.6	-7.1
Average GWL Change (ft)	0.2	-0.4	0.8	0.2	-0.6
Range of GWL Change (ft)	17.9	11.9	15.3	13.9	10.3
Number of Wells	158	47	54	50	7
REDDING BASIN					
Maximum Increase in GWE* (ft)	9.1	0.1	9.1	2.9	0.8
Maximum Decrease in GWE (ft)	-3.7	-1.4	-2.3	-3.1	-3.7
Average GWL Change (ft)	-0.3	-0.8	1.2	-0.5	-0.6
Range of GWL Change (ft)	12.8	1.5	11.4	6.0	4.5
Number of Wells	29	4	5	15	5
TOTAL					
Maximum Increase in GWE* (ft)	14.3	4.5	11.4	14.3	10.9
Maximum Decrease in GWE (ft)	-25.7	-17.1	-10.8	-25.7	-15.8
Average GWL Change (ft)	-0.7	-0.9	0.0	-0.9	-1.4
Range of GWL Change (ft)	40.0	21.6	22.2	40.0	26.7
Number of Wells	478	108	138	191	41
Note: A positive number indicates that groundwater levels were higher in 2009 than in 2008; a negative number indicates that groundwater levels were lower in 2009 than in 2008.					
*GWE=Groundwater Elevation					

